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3 **AMENDMENTS TO THE CLAIMS**

4 This listing of claims will replace all prior versions, and listing, of claims in the  
5 application:

6

7 **Listing of claims:**

8

9

10 1. (CURRENTLY AMENDED) A method of forming a semiconductor device  
11 comprising:

12 a) forming a gate structure over a substrate being doped with a first conductivity type  
13 impurity;

14 b) performing a doped depletion region implantation by implanting ions being the a  
15 second conductive type ~~to~~ into the substrate to form doped depletion regions;  
16 ~~beneath and separated from said source/drain regions;~~

17 c) performing a S/D ~~implantation~~ implant by implanting ions having a the second  
18 conductivity type into the substrate to form S/D source and drain regions  
19 adjacent to said gate structure; the doped depletion regions are beneath and  
20 separated from said source and drain regions;

21 (1) said doped depletion regions ~~have~~ having an impurity concentration and  
22 thickness so that said doped depletion regions are depleted due to a built-in  
23 potential created between said doped depletion regions and said substrate.

24

25 2. (CURRENTLY AMENDED) The method of claim 1 wherein said doped depletion  
26 ~~region~~ regions are not formed under said gate structure.

27 3. (CURRENTLY AMENDED) The method of claim 1 which further includes said  
28 doped depletion regions ~~have a~~ having an impurity concentration so that ~~the a~~ built-in

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1 junction potential between said doped depletion regions and said substrate forms  
2 depletion regions in the substrate between the ~~source/drain~~ source and drain regions and  
3 the doped depletion regions region;  
4 said depletion regions have a net impurity concentration of the first conductivity  
5 type.

6  
7 4. (CURRENTLY AMENDED) The method of claim 1 which further includes said  
8 doped depletion regions ~~have a~~ having an impurity concentration so that the a built-in  
9 junction potential between said doped depletion regions and said substrate forms  
10 depletion regions in the substrate between the ~~source/drain~~ source and drain regions and  
11 the doped depletion region; said depletion regions have a net impurity concentration of  
12 the first conductivity type;

13 said depletion regions have a net impurity concentration between 1E16 to 5E18  
14 atom/cc.

15  
16 5. (CURRENTLY AMENDED) The method of claim 1 which further includes  
17 implanting ions of ~~a~~ the first impurity type into said substrate between said ~~source/drain~~  
18 source and drain regions and said doped depletion regions.

19 6. (CURRENTLY AMENDED) The method of claim 1 which further includes  
20 performing an implant type selected from the group consisting of Halo implant, threshold  
21 voltage implant, and a field implant, that implant ions of ~~a~~ the first impurity type into  
22 said substrate at least between said ~~source/drain~~ source and drain regions and said doped  
23 depletion regions.

24 7. (CURRENTLY AMENDED) The method of claim 1 wherein ~~the~~ a region of said  
25 substrate between said source/drain regions and said doped depletion regions has a  
26 concentration of ~~a~~ the first conductivity type impurity between 1E16 to 1E18 atom/cc;  
27 a channel region in said substrate under said gate structure; said channel region has a  
28 concentration of a second type impurity between 1E16 to 1E18 atom/cc.

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- 1  
2 8. (CURRENTLY AMENDED) The method of claim 1 wherein said doped depletion  
3 regions are fully depleted.  
4 9. (CURRENTLY AMENDED) The method of claim 1 which further includes performing  
5 LDD implantation by implanting ions being a the second conductivity type into the  
6 substrate using the gate structure as a mask to form LDD regions.  
7 10. (CURRENTLY AMENDED) The method of claim 1 which further includes  
8 performing a LDD implantation by implanting ions being a the second conductivity type  
9 into the substrate using the gate structure as a mask to form LDD regions;  
10 the LDD regions are formed before the doped depletion regions.  
11 11. (CURRENTLY AMENDED) The method of claim 1 which further includes  
12 performing a LDD implantation by implanting ions being a the second conductivity type  
13 into the substrate using the gate structure as a mask to form LDD regions;  
14 wherein the doped depletion regions are formed after the LDD regions.  
15 12. (CURRENTLY AMENDED) The method of claim 1 wherein said first ~~conductive~~  
16 conductivity type is p-type and said substrate has a boron concentration between 1E17  
17 to 1E19 atom/cc.  
18 13. (CURRENTLY AMENDED) The method of claim 1 wherein said first ~~conductive~~  
19 conductivity type is n-type and said substrate ~~has~~ has a an As or P concentration  
20 between 1E 17 to 1E 19 atom/cc.  
21 14. (CURRENTLY AMENDED) The method of claim 1 wherein said ~~first conductive~~  
22 ~~type~~ substrate is comprised of Si or SiGe or strained Si, or relaxed SiGe or strained Ge.  
23 15. (ORIGINAL) The method of claim 1 wherein said gate structure has a channel width  
24 between 0.04 and 0.5  $\mu\text{m}$ .  
25 16. (ORIGINAL) The method of claim 1 which further includes performing a LDD  
26 implantation by implanting ions being a the second conductivity type into the substrate  
27 using the gate structure as a mask to form LDD regions;

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- 1 the LDD implantation is performed by implanting As ions at a dose between  $5E14$  and  
2  $1E16$  atoms /cm<sup>2</sup>, at an energy between 1 keV and 10 keV.
- 3 17. (ORIGINAL) The method of claim 1 which further includes performing a LDD  
4 implantation by implanting ions being a the second conductivity type into the substrate  
5 using the gate structure as a mask to form LDD regions;
- 6 the LDD implantation is performed by implanting Boron ions at a dose between  $1E14$  and  
7  $5E15$  atoms /cm<sup>2</sup>, at an energy between 1 keV and 10 keV.
- 8 18. (CURRENTLY AMENDED) The method of claim 1 wherein the doped depletion  
9 region implantation is performed by implanting As or P ions at a ~~does~~ dose between  
10  $5E12$  and  $5E13$  atoms/cm<sup>2</sup>, at an energy between 100 keV and 500 keV; said doped  
11 depletion region ~~has~~ having a minimum depth below ~~the substrate~~ a surface of said  
12 substrate between 0.09 and 0.7  $\mu$ m.
- 13 19. (CURRENTLY AMENDED) The method of claim 1 wherein the doped depletion  
14 region ~~implant implantation~~ is performed by implanting boron ions at a ~~does~~ dose  
15 between  $5E11$  and  $5E13$  atoms/cm<sup>2</sup>, at an energy between 50 keV and 200 keV; said  
16 doped depletion region ~~has~~ having a minimum depth below ~~the substrate~~ a surface of the  
17 substrate between 0.09 and 0.7  $\mu$ m.
- 18 20. (CURRENTLY AMENDED) The method of claim 1 wherein the S/D implantation  
19 ~~implant~~ is performed by implanting arsenic (As) or phosphorus (P) ions at a dose  
20 between  $5E14$  to  $1E16$  atoms/cm<sup>2</sup>, at an energy between 50 keV and 80 keV; said  
21 ~~Source/drain~~ source and drain regions ~~have~~ having a depth below ~~the substrate~~ a surface  
22 of said substrate of between 0.04 and 0.5  $\mu$ m.
- 23 21. (CURRENTLY AMENDED) The method of claim 1 wherein said second  
24 conductivity type is p-type; and said S/D implant is performed by implanting boron ions  
25 at a dose between  $5E14$  to  $1E16$  atoms/cm<sup>2</sup>, at an energy between 50keV and 80keV; said  
26 ~~source/drain~~ source and drain regions have a depth below ~~the substrate~~ a surface of said  
27 substrate of between 0.04 and 0.5  $\mu$ m.

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1 22. (ORIGINAL) The method of claim 1 which further includes said gate structure having  
 2 sidewalls; and forming one or more spacers on the sidewalls of said gate structure.

3  
 23. (CURRENTLY AMENDED) A method of forming a semiconductor device comprising:

- a) forming a gate structure over ~~on~~ a substrate being doped with a first conductivity type impurity;
- b) performing a doped depletion region implantation by implanting ions ~~being the~~ a second ~~conductive~~ conductivity type to the substrate to form doped depletion regions beneath and separated from said source/drain regions;
  - (1) said doped depletion regions have an impurity concentration and thickness so that said doped depletion regions are depleted due to a built-in potential created between said doped depletion regions and said substrate;
  - ~~(2) said doped depletion regions have a impurity concentration so that the built-in junction potential between said doped depletion regions and said substrate forms depletion regions in the substrate between the source/drain regions and the doped depletion region; said depletion regions have a net impurity concentration of the first conductivity type; said depletion regions have a net impurity concentration between 1E16 to 1E18 atom/cc;~~
- c) performing a S/D implantation ~~implant~~ by implanting ions having a being the second conductivity type into the substrate to form S/D source and drain regions adjacent to said gate structure;
  - (1) said substrate between said ~~source/drain~~ source and drain regions and said doped depletion regions has a concentration of a first type impurity between 1E16 to 1E18 atom/cc[.] ;  
said doped depletion regions have an impurity concentration so that the built-in potential between said doped depletion regions and said substrate forms depletion regions in the substrate between the source and drain regions and the doped depletion region; said depletion regions have a net impurity concentration of the

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first conductivity type; said depletion regions have a net impurity concentration between 1E16 to 1E18 atom/cc.

24. (CURRENTLY AMENDED) The method of claim 23 wherein said doped depletion regions ~~region~~ are not formed under said gate structure.

25. (CURRENTLY AMENDED) The method of claim 23 wherein ~~the~~ a region of said substrate between said source/drain regions and said doped depletion regions has a concentration of a said first conductivity type impurity between 1E16 to 1E18 atom/cc;  
a channel region in said substrate under said gate structure; said channel region has a concentration of a second conductivity type impurity between 1E16 to 1E18 atom/cc.

26.(CURRENTLY AMENDED) The method of claim 23 which further includes; said gate structure has sidewalls; forming one or more spacers on the sidewalls of said gate structure.

27. (CURRENTLY AMENDED) The method of claim 23 which further includes; said gate structure has sidewalls; forming two or more spacers on the sidewalls of said gate structure prior to the doped depletion region implantation.

#### CLAIMS 28 TO 35 ARE CANCELED

36.(NEW) The method of claim 1 which further includes said gate structure has sidewalls; forming one or more spacers on the sidewalls of said gate structure.

37. (NEW) The method of claim 1 which further includes said gate structure has sidewalls; forming two or more spacers on the sidewalls of said gate structure prior to the doped depletion region implantation.

38. (New) A method of forming a semiconductor device comprising:  
forming a gate structure over a substrate being doped with a first conductivity type impurity;

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performing a doped depletion region implantation by, using said gate structure as an implant mask and implanting ions being of a second conductive type into the substrate to form doped depletion regions;  
performing a S/D implantation by implanting ions of the second conductivity type into the substrate to form source and drain regions adjacent to said gate;  
the doped depletion regions are beneath and separated from said source and drain regions;  
said doped depletion regions have an impurity concentration and thickness so that said doped depletion regions are depleted due to a built-in potential created between said doped depletion regions and said substrate.

39. (New) The method of claim 38 which further includes said doped depletion regions having an impurity concentration so that a built-in junction potential between said doped depletion regions and said substrate forms depletion regions in the substrate between the source and drain regions and the doped depletion regions;  
said depletion regions have a net impurity concentration of the first conductivity type.
40. (New) The method of claim 38 wherein said doped depletion regions are fully depleted.